REMARKS/ARGUMENTS

The Claims

Claims 1-11 are pending herein, claims 1 and 7 being independent. No amendment has been made to the claims.

The Rejection:

The Examiner has rejected claims 1-6, under 35 U.S.C. §103(a) as allegedly obvious over Unites States Patent No. 6,738,388 (Stevenson, *et al.*), in view of United States Patent No. 6,141,596 (Gretta, *et al.*) and further in view of United States Patent No. 6,397,114 (Eryurak, *et al.*); and claims 7-11 under 35 U.S.C. §103(a)[1] as allegedly obvious in view of the primary combination and further in view of United States Patent No. 6,501,995 (Kinney, *et al.*).

The applicants have carefully considered the Examiner's rejection and the comments provided in support thereof, and respectfully disagree therewith. The applicants submit that the claims as filed are patentably distinct from the references applied by the Examiner.

Descriptive summary of the disclosed subject matter

The following description is based on the specification, is offered for the Examiner's convenience only, and is not intended to argue limitations which are unclaimed.

A method is disclosed for adjusting the data transmission rate in a fieldbus system that is suitable for controlling safety-critical processes and that comprises at least one subscriber

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[1] It is noted that the Examiner's rejection stated that claims 9-11, which depend from independent claim 7, were rejected based solely on the primary combination, while independent claim 7 was rejected based upon the primary combination in further view of Kinney, *et al.* Since the Examiner considered that the rejection of the base independent claim from which claims 9-11 depend required reliance on Kinney, *et al.* it is understood that the rejection of claims 9-11 should have included reliance on Kinney, and it is addressed in that fashion hereinbelow.

connected to the fieldbus. A fieldbus system is also disclosed for controlling safety-critical processes having a fieldbus to which at least one subscriber is connected.

Although the use of fieldbusses offers numerous advantages, mainly with respect to the extensive amount of wiring that would otherwise be required if the fieldbus were not used, heretofore it has not been possible to employ fieldbusses in practical applications for controlling safety-critical processes. This is due to the fact that, since the structure of such a system is freely accessible to any subscriber, the degree of fail safety necessary for controlling safety-critical processes could not be guaranteed.

One of the most important demands upon a fieldbus system for controlling safety-critical processes is a defined and rapid response time. This does not play a role in other known systems for data transmission, such as *via* a modem. A fieldbus system must be able to stop or shut down within a predetermined defined response time, for example in response to activating an emergency shutdown switch, in order to avoid any possible damage. The achievable response time mainly depends on the transmission rate of the fieldbus system. A high data transmission rate results in a short response time, since the load of the fieldbus decreases compared with a lower data transmission rate with the same number of subscribers. Hence, the time period for which a subscriber has to wait at the most before the fieldbus is enabled for its own transmission of data is also reduced.

For that reason, it is desirable to operate the system with a very high data transmission rate. However, operation of a fieldbus system at a high transmission rate encounters a problem in that the transmission quality between the transmitter and the subscriber decreases with the subscriber's distance from the transmitter and with increase in the data transmission rate.

Typically, the data transmission rate in a fieldbus system is adjusted manually by

providing respective adjustment devices at the subscribers' locations in the fieldbus system. These adjustment devices are, for example, DIP-switches.

The adjustment of the data transmission rate by manual manipulation of DIP-switches is very complex and susceptible to faults. Particularly in large fieldbus systems having a plurality of subscribers, it is not unlikely that the data transmission rate will be inadvertently mis-adjusted at at least one subscriber's location. This leads to the result that the subscriber is not able to communicate *via* the fieldbus, which could lead to fatal results when the fieldbus is used with safety-critical processes.

The present specification discloses a method wherein, in a first phase, the subscriber or subscribers log on at a lower, first data transmission rate to a central unit linked to a fieldbus. In a second phase, the central unit increases the data transmission rate of the subscriber or subscribers to a predetermined second, higher value. In a third phase, the subscriber or subscribers log on again at the central unit at the higher data transmission rate and the central unit shuts down the field bus when detecting a difference (inconsistency) between the number of subscribers logged on during the first and the third phases.

The advantage of this approach is that by using the central unit, an adjustment of the data transmission rate is possible which also meets safety-critical demands. After switching on the fieldbus system, first it is checked which subscriber is connected to the fieldbus. The central unit uses a relatively low data transmission rate, for example 20 kBaud. The low data transmission rate guarantees that *all* subscribers can be reached, regardless of the data transmission path. Thereafter, the central unit transmits a message ("telegram") to the connected subscribers with the instruction to increase the data transmission rate to a predetermined higher value (target value). This target value is selected so as to meet all safety-critical parameters, such as busload,

response time, *etc.* In the third phase, the subscriber/subscribers log on again at the central unit with the higher data transmission rate. Should a subscriber logged on in the first phase be determined to have not logged on again at the higher data transmission rate, presumably because it is too far away from the transmitter to achieve satisfactory transmission quality at the higher data transmission rate, for example, the fieldbus will immediately shut down. The process being controlled via the fieldbus system will then be transferred in a safety condition in response thereto.

Descriptive Summary of the Prior Art

Stevenson, *et al.* disclose a process control network, for example based on a fieldbus, and using the field-bus communication protocol. In column 8, lines 53-65, it is pointed out that the data may be sent over the bus sequence at any of a number of different communication baud rates or speeds according to the fieldbus protocol.

However, Stevenson, *et al.* fail to teach or suggest the adjustment of transmission data rates in response to any circumstances, and, in particular, fail to teach or suggest the shutting down of the system in response to a detected drop-out of one or more of the subscribers thereto. Moreover, Stevenson, *et al.* fail to teach or suggest that the fieldbus system may be used for safety-critical processes. The other references applied by the Examiner likewise fail to teach or suggest these aspects of the claimed invention, and therefore the combination of these references fails to render obvious the invention as claimed.

Gretta, *et al.* (US 6,141,596) relates to a fieldbus network configuration utility with improved scheduling and looping. This configuration utility allows the user to assemble a graphical program or wiring diagram on the screen which comprises a selected plurality of

function block icons which are linked with one or more wires connecting the function block icons. In short, this document concerns a software program for configuring a fieldbus network graphically.

However, this document fails to disclose a system or method with the features mentioned in the independent claims. Particularly, Gretta, *et al.* does not disclose operating the fieldbus in a first phase with a first low data transmission rate and in a third phase with a higher data transmission rate, wherein the central unit shuts down the fieldbus if it detects a deviation between the number of subscribers logged on in the first and the third phase.

In the paragraphs of this prior art document which were cited by the Examiner, no information directing a skilled person to these inventive features can be found.

Gretta, *et al.* do not disclose the features of operating the fieldbus at a first data transmission rate in a first phase and with a higher transmission rate in a third phase, and to subsequently check whether all subscribers on the fieldbus have answered.

Thus, Gretta *et al.* fail to teach or suggest the claimed invention, or to overcome the deficiencies of the Stevenson, *et al.* patent.

With respect to the third patent applied by the Examiner, Eryurek *et al.*, it is also noted that no hints directing one of ordinary skill in the art to the above-mentioned inventive features can be found. Eryurek, *et al.* disclose shutting down a system in a critical situation. However, they not disclose shutting down the system specifically related to one of the subscribers at the fieldbus not being able to transmit reliably at the higher transmission rate.

Eryurek, *et al.* teach or suggest that a system shut down may be initiated in response to a change in operating parameters or according to predefined rules (see col. 7, lines 34-35; and col. 9, lines 27-33). However, Eryurek, *et al.* fail to teach the key feature of shutting down a fieldbus

system as a result of a deviation in the number of subscribers logged on at two different data transmission rates.

This distinction is important, since Eryurek, *et al.* condition their shut down procedure upon the existence of a positive measurement (*e.g.,* too high a temperature or flow rates, col. 7, lines 31-35). They fail to teach that the loss of a subscriber, *i.e.* the *absence* of a device on the network, such as may occur due to an increase in the data transmission rate could lead to a system shut down.

For all these reasons, therefore, the subject-matter as defined in claims 1-6 is not obvious in view of the applied references.

As to claims 7-11, the Examiner has rejected these claims based on the primary combination, in further view of Kinney, *et al.* The failure of the primary combinations to teach or suggest features of the method claims discussed above also apply to the system claims, and so those arguments are considered pertinent to the system claims (7-11) as well. Furthermore, the addition of the Kinney, *et al.* patent overcomes none of these deficiencies, and therefore reinforces the patentability of the invention as disclosed and claimed.

Kinney, *et al.* disclose a process control system for validation of the components thereof. The way Kinney, *et al.* use the term, "validation" refers to confirming the trustworthiness of a subscriber, as in an e-commerce transaction (col. 2, ,liens 33-35), not as to the *presence* of a customer at two different times during the transaction. The Examiner has cited Kinney, *et al* for using a comparator. However, claim 7 recites not merely a comparator, but rather a comparator which compares the log-in data stored in the memory units of the system. Kinney, *et al.*, fail to teach or suggest the storage of the log-in data, and would have no reason to do so, since they are unconcerned with the difference in the number of subscribers on the system at any time, and

whether that number varies at different data transmission rates.

Thus, Kinney, *et al.* also fail to teach or suggest the invention as claimed.

Since the references relied on by the Examiner, when applied singly or in combination, fail to teach the inventive feature of comparing the number of subscribers on a system at two different transmission rates, it is respectfully submitted that the combination of references fails to teach or suggest the invention as claimed.

Accordingly, withdrawal of the rejections based upon the combinations of references suggested by the examiner is respectfully solicited.

Other matters

It is noted that the Examiner's notations on the form PTO-1449 transmitted with the Office Action indicated that the references DE 42 42 936 and EP 0 896 449 were not considered. No basis for this failure to consider was provided. It is noted that DE 42 42 936 is discussed in the specification at page 2, lines 6-10, and EP 0 896 449 is discussed at page 4, lines 15-18, and so consideration of these references is requested. Otherwise, the Examiner is requested to explain why the references were not considered and made of record.

Conclusion

For all the reasons provided above, reconsideration and withdrawal of the rejections is respectfully solicited, and it is requested that the Examiner pass the application to issue.

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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